the improvement of apples and other tree and vine fruits, by S. A. BEACH, W. T. MACOUN, and J. A. BURTON; the breeding of cereals by L. S. KLINK and C. E. SAUNDERS; the improvement of hops by selection and breeding by W. W. STOCKBERGER; on cotton-breeding by DAVID COKER, H. J. WEBBER, and D. A. SAUNDERS; the breeding of fiber crops, by J. H. SHEPPARD, L. H. DEWEY, FRITZ KNORR, and H. L. BOLLEY; the breeding of vegetables, by W. W. TRACY; roses by PETER BISSETT, and W. VAN FLEET; tobacco by A. D. SHAMEL, J. B. STEWARD, A. D. SELBY, and W. H. SCHERFFIUS; carnations by C. W. WARD; forage crops by T. F. HUNT and H. S. ALLARD; and forest and nut trees by GIFFORD PINCHOT, W. L. JEPSON, and G. L. CLOTHIER. In all of these articles, as well as in a number dealing with animal breeding, there are many facts recorded which are of more than passing scientific interest. Papers of a more strictly theoretical scientific character are: "Organic correlations," by E. M. EAST, "Some gaps in our knowledge of heredity," by H. J. WEBBER, "The composition of a field of maize," by G. H. SHULL, "Recent advances in the theory of heredity," by C. B. DAVENPORT, "Color factors in mammals," by W. J. SPILLMAN, and "Mendelian phenomena and discontinuous variation," by W. J. SPILLMAN. The wide range of subjects and the almost uniform high excellence of the papers and reports included in this volume show that the American Breeders' Association has a large mission to fill, and that it is filling it creditably. These annual reports are made the treasure-house of all the best things gained in the experience of our foremost practical breeders and students of heredity during the progress of their work. The efforts made by the practical breeders to present their experience in as proper scientific form as possible, and to interpret those experiences in the light of the latest scientific results, and the efforts of the scientific breeders to state their results in as simple, direct, and comprehensible a manner as possible, have a most salutary effect upon all those connected with the American Breeders' Association, and must continue to supply us with the best annual crops of information regarding the factors which enter into the breeder's work, whatever may be his motive in breeding.—GEORGE H. SHULL.

MINOR NOTICES

Sertum Madagascariense.[4]—This paper is based on two collections of plants made in Madagascar, one by JOHN GUILLOT in the district of Vatomandry on the east coast and the other by HENRI RUSILLON on the plateau of Imerina. The first part of the work consists of a brief consideration of the botanical geography; and in the second part the author in collaboration with several prominent European specialists, gives a list of the species. Among the plants recorded 26 species and 4 varieties are described as new to science. The larger and more critical genera are accompanied by analytical keys to the species, and several text-figures have been introduced. A complete index to the vernacular and scientific names is also

[4] HOCHREUTINER, B. P. G., Sertum Madagascariense. Ann. Conserv. et Jard. Bot. Genève 11–12:35–135. *figs. 23.* 1907–1908.

added. The work is a notable contribution to our knowledge of the flora of Madagascar.—J. M. GREENMAN.

North American Flora.[5]—Part 4 of Vol. XXII contains a continuation of Dr. P. A. RYDBERG's elaboration of the Rosaceae. The groups treated are Potentilla and the related genera. In all sixteen genera are here considered, and to these the author refers 277 species, of which 70, approximately one-fourth, are described as new. Potentilla leads with 176 recognized species, 44 being published as new to science. Two new genera (*Zygalchemilla* and *Lachemilla*) are proposed.—J. M. GREENMAN.

NOTES FOR STUDENTS

Longevity of seeds.—In a long paper[6] EWART classifies seeds according to their duration of life under optimal conditions as: microbiotic seeds, with a longevity of less than 3 years; mesobiotic, with a longevity of 3 to 15 years; and macrobiotic, with a longevity of 15 to 100 years. Most of the paper (175 out of 210 pages) is taken up with a table, drawn from the works of various investigators, showing the age, percentage of vitality, etc., of various stored and buried seeds. EWART says: "Longevity depends not on the food materials or seed coats, but upon how long the inert protein molecules, into which the living protoplasm disintegrates when drying, retain the molecular grouping which permits of their recombination to form the active protoplasmic molecule when the seed is moistened and supplied with oxygen." Longevity, however, he holds, is in general found in seeds with seed coats impervious to water, and asserts that this impermeability is due to cuticular structures in almost all cases examined. In *Adansonia digitata*, on the other hand, all layers of the coats are equally resistant to water.

He agrees with CROCKER that seed-coat characters rather than embryo characters account for the greater number of cases of delayed germination, and he makes considerable use of the data of this writer as evidence on this point. He believes that the longevity of seeds in soil is far less than is generally assumed. The maximal duration of the seeds of certain Leguminosae under optimal conditions is stated to be between 150 and 250 years, and of Malvaceae and Nympheaceae between 50 and 150 years. An appendix by Miss JEAN WHITE gives the structure of the coats of various resistant seeds. The body of the work is marred by a number of inexcusable errors in the statement of the results of other investigators. —WM. CROCKER.

Enzymes.—GRÜSS has suggested[7] a method of capillary analysis of enzymes for which he claims considerable value. It consists in pulverizing a portion of the

[5] North American Flora, Vol. XXII, Part 4, pp. 293–388. New York Botanical Garden, 1908.

[6] EWART, ALFRED J., On the longevity of seeds. Proc. Roy. Soc. Victoria. N.S. **21**:1–20. *pls. 1, 2.* 1908.

[7] GRÜSS, J., Kapillaranalyse einiger Enzyme. Ber. Deutsch. Bot. Gesells. **26a**: 620–626. 1908.